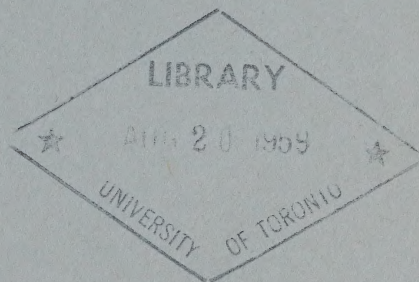


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Division



Canada
Department of Mines
and Technical Surveys



Annual Report of the

EXPLOSIVES

DIVISION

Calendar Year
1958



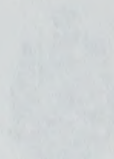
Canada
Department of Mines
and Technical Surveys

Report of the

EXPLOSIVES
DIVISION

Calendar Year 1958

by
H. P. Kimbell
Chief Inspector



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OTTAWA, 1959


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(Dominion Astrophysical Observatory photo)

"The largest non-nuclear, man-made explosion in history...." erupted at 9.30 a.m. on April 5, 1958, and sheared off the submerged twin peaks of Ripple Rock. This notorious shipping hazard in Seymour Narrows, 100 miles north of Vancouver, B.C. has sunk or severely damaged more than 100 vessels with the loss of 114 lives over the past 80 years. Two and three-quarter million pounds of explosive blasted 700,000 tons of rock and water 1,000 feet in the air to clear the channel.

The Explosives Division exists solely in the interests of public safety. Its function is to administer the Explosives Act, an Act which controls, by a system of licences and permits supported by inspection, the manufacture, authorization, sale, storage, and importation of explosives, as well as transportation of explosives by road.

Offices and Staff

In accord with departmental policy to consolidate Ottawa offices in the Booth-Carling area, the Division's main office was moved in September to the administrative wing of the new Mines Branch building at 555 Booth Street, Ottawa. Branch offices are maintained at 739 West Hastings Street, Vancouver 1, British Columbia, and at 7 Terminal Road, Halifax, Nova Scotia. Advice regarding the Explosives Act may be obtained at any of these offices but all applications for factory and magazine licences, certificates for registered premises, and permits to import and transport explosives should be addressed to the Chief Inspector of Explosives, Department of Mines and Technical Surveys, 555 Booth Street, Ottawa 1. The Division's testing laboratory is on the River Road, near Uplands Airport on the outskirts of Ottawa.

Total staff of the Division numbers twenty, made up of six inspectors, two chemists, a laboratory technician, and eleven clerical personnel. The inspection staff was brought up to establishment in March by the appointment of E. Joseph Fraser as Senior Inspector of Explosives. Mr. Fraser came to the Division with considerable experience in explosives gained with the Department of National Defence in both the United States and Canada.

The year was marked by the death on February 8 of the founder of the Division, Lt.-Col. G. Ogilvie, C.M.G., R.A., p.a.c. In 1919 Col. Ogilvie was appointed to bring the Explosives Act into operation and was Chief Inspector from that time until 1936 when he was transferred for special duties to the Department of National Defence. From 1936 until his death he was engaged in various governmental capacities involving military explosives, but maintained a keen interest in the Division whose foundations he laid.

In March the Division lost the services of Mrs. A. J. Byrnes by retirement on superannuation. During her 18 years as supervisor of the headquarters clerical staff Mrs. Byrnes became well known for her courtesy to office visitors and was an able assistant to three successive Chief Inspectors.

Explosives Division

Ammonium Nitrate Blended with Fuel Oil

Since passage of the "Ammonium Nitrate and Fuel Oil Order" by Order in Council P.C. 1957-335, 14 March, 1957 the use of this field-mixed explosive has been steadily expanding. Because ammonium nitrate itself is not an explosive within the meaning of the Act, accurate statistics on its use are not available, but it is estimated that ammonium nitrate sensitized with fuel oil constituted 11 per cent of explosives used in Canada in 1958. The corresponding figure for the United States, where this development originated, is said to approximate 30 per cent.

Most users of ammonium nitrate-fuel oil are quarry operators, and there have been no recorded accidents; in fact the opinion has been expressed that in spite of the do-it-yourself feature, the relative insensitivity of the explosive is actually a contribution to general safety. However, since fixed explosives are always used as primers, and the fuel oil itself is a fire hazard, it is important that normal explosives safety precautions, such as the "NO SMOKING" rule, be rigidly observed.

Manufacture

The sharp upward trend of the past three years was reversed in 1958 as production of commercial blasting explosives declined to 147,750,000 pounds from 169,492,000 in 1957. This reduction was no doubt due partly to the general business recession but the use of ammonium nitrate-fuel oil also made appreciable inroads. Furthermore, the blasting work for construction of the St. Lawrence Seaway neared completion in 1958. Consumption of explosives on this project will approximate 23,000,000 pounds.

Licensed factories are listed in Appendix A; a 1958 addition was Modern Fireworks Limited, Orangeville, Ontario, but this company failed before the year ended.

Authorization

A complete list of explosives that have been authorized for manufacture and importation is given as Appendix D. An interesting addition for 1958 is "Hydromex"; as the name indicates, this is a so-called "water-compatible" explosive but its use is still very much in the development stage.

During the year 185 samples were received and examined by the Division laboratory as follows:

Commercial Blasting Explosives	
(a) for authorization.....	17
(b) factory run-of-work.....	24
Small Arms Ammunition.....	20
Fireworks.....	116
For other Government Departments.....	8

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The samples "for other Government Departments" represent assistance rendered in connection with the assessment of hazards in the handling and transportation of explosives and other dangerous goods. Chiefly involved are Department of National Defence, Department of Transport, and the Post Office Department.

In addition, 39 shipments of Chinese firecrackers were sampled and tested at the port of Vancouver. The RCMP render a valuable service in this connection.

Licences, Permits and Certificates

The following were issued during the year; comparative figures for 1957 are shown in brackets:

Factory Licences.....	19	(20)
Magazine Licences (storage for sale).....	438	(458)
Temporary Magazine Licences.....	1032	(939)
(storage for private use)		
Registered Premises Certificates.....	100	(122)
(storage of small quantities for sale)		
General Importation Permits.....	1357	(1252)
(one shipment only)		
Annual Importation Permits.....	40	(39)
Transportation Permits (by road).....	265	(242)

Imports

The explosives imported under the permits included in the above list are detailed in Appendix B. The large quantity under the heading "for other manufacturing purposes" is mainly nitro-cellulose of the grade used in the manufacture of lacquers, coated fabrics and films. The "Nitramex 2H" was imported exclusively for the demolition of Ripple Rock, that notorious hazard to shipping in Seymour Narrows between Vancouver Island and the mainland of British Columbia. This demolition was an important event of 1958 and involved the detonation in a single blast of 2,756,000 pounds, the largest in history. It was fired at 9:31 a.m. on 5 April and culminated 2½ years of preparation by tunnelling.

Inspections

The number of inspections carried out during the year, including those by Deputy Inspectors of Explosives of the RCMP, was as follows:

Factories.....	39
Magazines.....	2,129
Registered Premises.....	159
Transportation.....	81
Storage in Unlicensed Premises.....	156

Explosives Division

Thefts

Thefts of explosives reported during the year numbered thirty-two, compared with twenty-seven in 1957. Explosives stolen totalled 2,030 pounds of dynamite, 11,070 detonators (blasting caps), 7,400 feet of safety fuse, 2,000 feet of "Primacord", and 300 railway track torpedoes; seventeen thefts were from licensed magazines and these involved the bulk of the explosives.

Culprits were apprehended in only eight instances, and all were juveniles who had pilfered small quantities for mischievous purposes. Three boys were injured, two seriously, as the result of these thefts. Careful observance of the security requirements of the Regulations would have prevented most of such petty thefts. However small the quantity, explosives must be kept in securely locked boxes marked "EXPLOSIVES", one for dynamite and one for detonators.

One theft was followed by particularly daring blasting experiments, though fortunately no one was injured. After stealing safety fuse, detonators and 40 sticks of dynamite from a mine magazine six boys aged 8 to 13 set off four blasts before being apprehended. The first experiment was in a gravel pit, but the boys graduated from this to blowing up an old car in a junk dealer's lot, and then a shed at the town dump. Realizing the police were on their trail, they detonated the last 19 sticks on the bank of a river near a bridge. There was evidence that some fuse used had been cut as short as ten inches. Four of the boys were convicted of breaking, entering and theft, and were put on probation for twelve months.

Abandoned Explosives

It is hard to understand the acts of criminal carelessness brought to light by the annual statistics of abandoned explosives. Forty-four reports were received in 1958, mostly from Deputy Inspectors of Explosives of the RCMP. Total quantities left lying about were 5,469 pounds of dynamite and 1,922 detonators. Included in the "abandoned" figures were many instances where small quantities were cached away for future use and forgotten. Too frequently such explosives are found by juveniles who almost always tamper with them. This happened in fifteen instances and five of them were brought to light by accident reports.

Abandoned explosives are frequently found at disused mining properties. Four such instances accounted for 2,625 pounds of the dynamite total, and another 1,750 pounds was abandoned along the route of a power transmission line following its construction.

Attempts are always made to find those responsible for abandonment of explosives and in 1958 eleven instances resulted in prosecution.

Destruction of Explosives

There were fifty-five reports of "necessity to destroy" explosives and the total destroyed was 9,769 pounds dynamite, 1,759 detonators and small quantities of other types. Included were most of the abandoned explosives referred to above, but added to them were explosives that had to be destroyed because of deterioration resulting from poor or prolonged storage.

The record shows nearly 5,000 pounds of dynamite was destroyed for this reason. Inspectors find it necessary to continually warn users of explosives that dynamite is a perishable commodity which should be used as early as possible after the date of manufacture stamped on each package.

Prosecutions

The number of prosecutions increased in 1958 over 1957, the figures being forty-four and thirty-three respectively. In three cases, up to three persons were prosecuted for the same offence. There were forty-one convictions, one dismissal and two are pending at the time of writing. Offences were as follows:

Act, Section 5(1) (manufacture of unauthorized explosive).	7
Act, Section 5(2) (c) (unmaking damaged explosive).....	2
Act, Section 5(4) (storage without licence).....	8
Regulations, Part VI (illegal transportation).....	14
Regulations, Part VIII (illegal magazine conditions).....	1
Regulations, Part XIII (illegal storage of small quantities).	12

The seven prosecutions under Section 5(1) arose from three dangerous adventures with home-made explosives by youths and young men. Two of the offences caused damage and injury and are referred to in Appendix C, Part II. The offenders were found guilty but penalties were suspended. No damage or injury resulted in the third case in which a home-made bomb thrown on a bonfire caused much neighbourhood concern. In this instance three persons were fined \$10 and costs each.

When a quantity of shotgun ammunition became damaged by flood water, instructions were given by the owner to dispose of it by immersion in a lake. However, he failed to supervise the operation and two men were prosecuted for breaking down the cartridges to salvage the lead shot, an operation that is legally carried out only in a licensed factory. *Any damaged or deteriorated explosive ceases to be an authorized explosive* and is a potential hazard; it should be kept in careful security and expert advice sought.

Illegal storage accounted for twenty-one of the prosecutions and fines ranged up to \$100 and costs. The term "storage without licence" nearly always indicates that storage conditions were unsafe and insecure. Licenses on the other hand, being controlled by inspection, usually maintain safe conditions, but one was prosecuted for failure to do so. The other twelve cases are examples of the insecure conditions which so frequently result in accident when children gain possession. The Regulations provide that quantities not exceeding 150 pounds of dynamite and 2,000 detonators may be held without a licence, but must be stored in locked, detached stores or suitable receptacles, one for dynamite and one for detonators, safely located, kept exclusively for the purpose, and marked "EXPLOSIVES".

A serious view is taken of offences that affect safety on the public highways where the general accident rate gives cause for so much concern. The fourteen prosecutions in this category resulted in fines up to \$150.

Explosives Division

The offences included (a) using a vehicle totally unsuitable for carrying explosives, (b) carriage of dynamite and detonators together without adequate separation, (c) failure to carry a fire extinguisher, (d) failure to display "EXPLOSIVES" warning signs, (e) failure to stop at a railroad crossing, (f) leaving loaded vehicle unattended, (g) carrying explosives in contact with steel and (h) exceeding the speed limit.

Reports were also received of six prosecutions under the Criminal Code for offences involving explosives. Two of them involved obvious infractions of the Act and Regulations, again confirming that some violations of the Act are also offences under the Criminal Code. In one instance prosecution was entered following fire and explosion which completely demolished a parked automobile. Six sticks of dynamite and twelve detonators were being carried in the rear seat and were believed ignited by a cigarette butt discarded by the driver and blown back through the rear window. The charge of negligence under Section 77 of the Criminal Code was withdrawn however and Court costs only assessed, when it developed that the insurance company refused to pay damages and the accused consequently had to bear the loss of the car. Fortunately no one was injured.

Accidents

A complete analysis of reported accidents is found in Appendix C, Part I. The total from all causes is 123 and this compares with 111 for 1957 and 113 for 1956. The number of fatalities was high at 24, compared with 7 for 1957 and 19 for 1956.

In Use

(1958) 73 accidents, 15 killed, 90 injured

(1957) 64 accidents, 7 killed, 90 injured

Because labour legislation is a matter for provincial jurisdiction, the Act does not control the using of explosives. Provincial mining Acts control use in mines, but not all provinces have legislation that governs use elsewhere. Certain provinces, in a serious endeavour to ensure competence of workers, insist that employees who use explosives possess a Blaster's Certificate or Shotfirer's Permit.

The Table in Appendix C, Part I indicates that most of the "in use" accidents could have been avoided by observing rudimentary precautions. For example, 12 accidents (2 fatal) resulted from failure to take proper cover, and 12 (7 fatal) were caused by drilling into unexploded charges. It is significant that records of one provincial mining authority show 14 prosecutions for violations of mining Act regulations, including 9 for faulty drilling procedure.

In Manufacture

(1958) 6 accidents, 1 killed, 8 injured

(1957) 10 accidents, none killed, 12 injured

The fatal accident resulted when the trinitrotoluene (TNT) plant at the Beloeil factory of Canadian Industries Limited was completely destroyed by fire and explosion on 12 August during start-up operations after

a two-week shutdown. One operator died from the effects of third-degree burns, one recovered from serious burns, and three sustained minor injuries. Investigation disclosed that the explosion resulted when a tri-nitration batch went out of control following a too rapid addition of bi-oil to acid. It appeared that standard procedure was not followed and that first signs of trouble were not adequately dealt with. The following recommendations were made:

(a) Nitrator inlet valves should be so designed that they close automatically when manual pressure is released.

(b) The drowning mechanism should be so designed that it is actuated automatically by excessive nitrator temperature.

(c) An emergency drill should be instituted and rehearsed regularly. This should involve an alarm system to alert everyone in the building.

(d) Closer supervision is necessary, particularly at start-up times when conditions are apt to be other than normal.

(e) In the new design of this facility, nitration operations should be isolated in a separate building.

Although there were no casualties, another accident was serious enough to be investigated by an inspector. On 8 April a cartridging building housing two vibropacker machines was completely destroyed by fire and explosion at the Beloeil, Quebec, factory of Canadian Industries Limited. Fortunately the five occupants had ample time to escape. First evidence of trouble was a flash at, or near, the one vibropacker in operation, but the explosion did not occur until about 9 minutes later, when the entire explosive contents of the building, totalling 1,750 pounds of semi-gelatin, detonated. There was some structural damage, but not serious, to an operating building 450 feet away. Cause of ignition was not definitely determined but probably resulted from friction at some point in the machine. Recommendations were made for improvements in vibropacker design and installation, in order to lessen possible friction hazards and also to facilitate frequent maintenance inspection of vulnerable parts.

The other four accidents involved minor injuries only.

In Conveyance by Road

(1958) 5 accidents, no casualties

(1957) 4 accidents, 2 injured

Two of these accidents, involving complete destruction of the explosives load in each instance, gave serious cause for concern. After the second, in November, a circular entitled "A Warning about Trucking Explosives" was prepared and has now been widely distributed. Canadian Industries Limited also published a bulletin outlining the regulations for safe transportation by road. Details of the two accidents follow:

1. Near Brockville, Ont., 29 September, 1958.

A $\frac{1}{2}$ -ton 1950 truck, carrying 1,500 pounds of dynamite in the box, and 1,000 electric detonators on the seat of the cab, caught fire. The vehicle and load were completely demolished. Although the dynamite

Explosives Division

did not detonate, the detonators exploded about 5 minutes after the fire was first noticed. Fortunately there were no casualties and damage was limited to the truck and load.

Investigation disclosed that the most likely cause of the fire was local overheating of the truck platform by gases leaking from a badly corroded exhaust pipe. In addition, the vehicle was obviously overloaded. It was also determined that the packages of explosives were not protected from the steel of the truck box and were not covered as required by the Regulations. Prosecution resulted in fines totalling \$150.

2. *Near St. Eustache, Quebec, 21 November, 1958.*

A 10-ton 1958 diesel dump-truck, carrying 2,000 pounds of dynamite and 400 electric detonators in close proximity, caught fire. The dynamite detonated about 10 minutes after the fire was first noticed. The driver, alerted to the fire by a passing motorist, stopped the vehicle immediately. A farm dwelling and barn, about 30 feet away, were totally destroyed; a mother and child, alerted only just in time, escaped through the back door and were protected by the house when the explosion occurred. A neighbour's house 400 feet away was shifted off its foundation by the blast and had to be vacated. The truck was completely demolished and fairly large pieces of debris were thrown as far as 450 feet. Damages may amount to \$100,000.

In this instance the truck was obviously completely unsuitable for carrying explosives; its exhaust system was so designed that the gases were used to heat the platform of the box. Not one of the regulations was observed; not even a fire extinguisher was carried, and no warning "EXPLOSIVES" signs were displayed. No more care was taken than if the load had been limestone or gravel. Prosecution is proceeding under various Sections of the Regulations and under the Criminal Code.

Although the explosives load was not affected, a third accident also indicates the grave possibilities involved:

Four persons were killed when their automobile collided with a truck carrying 10,000 pounds of 90 per cent nitroglycerine explosive. The driver of the truck was uninjured and was exonerated of blame. The gasoline tank of the automobile was ruptured but fortunately there was no fire.

In Misuse

(1958) 35 accidents, 3 killed, 50 injured

(1957) 30 accidents, none killed, 39 injured

All the accidents due to misuse are briefly described in Appendix C, Part II. Compared with 1957 there were two less accidents caused by playing with detonators, but nearly all such accidents could be prevented by the simple precaution of keeping these potentially dangerous caps in a locked receptacle marked "EXPLOSIVES" as required by the law of common sense, as well as the Explosives Act. Although continuous efforts are made to warn all users of explosives in this matter, the Division is also consulting provincial Departments of Education with the hope that warnings to school children may eventually be included in safety curricula.

Also, a pamphlet entitled "Hazards of Explosives to Children and Teenagers" has been prepared and sent to publications which are distributed to parents and teachers.

Despite statements in manufacturers' handbooks that "Primacord" is very insensitive to normal shock and friction, the boy whose hand was permanently injured proved that the textile coverings enclose a sensitive explosive that *can* be detonated by shock or friction. The pipeline contractor in this case showed appalling carelessness; abandoned fuse was so plentiful along the line of work that children used it as skipping rope, and people made clotheslines of it. Pipeline contractors have gained an unsavoury reputation for carelessness with explosives. Perhaps this is because haste is vital in their contracts—but how often is haste just another word for death or mutilation!

Users of explosives can be subject to civil court action when injuries result from their failure to keep explosives in proper security. One such action recently resulted in settlement out of court in the amount of \$2,250. A boy had been injured when he tampered with a detonator found at the site of a sewer construction project.

It is noteworthy that of the seven fireworks accidents, four (in which eight people were injured) were not caused by "shop goods" sold to the general public by retailers, but were the result of inadequate supervision of organized displays. To young people, fireworks have a fascinating attraction and those in control of displays must never for a moment forget it. Fireworks must be kept under careful security both before and during firing, and the area must be carefully searched afterwards to ensure that no unexploded material remains.

Last year 8 teen-aged boys were injured (none fatally) in five accidents with home-made rockets. This year 10 were injured, 1 fatally. In January a warning press release was issued and received good coverage in the Canadian press. Television interviews with inspectors aided this publicity campaign and such publications as *Canadian Aeronautical Journal*, *Canadian Pharmaceutical Journal*, and others, stressed the dangers. Pharmaceutical associations gave valuable cooperation by asking members to stop selling to juveniles ingredients that could be used to make dangerous propellant compositions.

One unusual accident in the home-made, but adult, category, involved an explosive manufactured for his own use by a person apparently well known locally as a blasting "expert". He was killed when his sensitive concoction exploded by friction. Section 5(1) of the Act reads "No person shall have in his possession, . . . store, use, make or manufacture, whether wholly or in part, . . . any explosive that is not an authorized explosive." If proof were needed of the necessity for this Section, this unfortunate occurrence would provide it.

APPENDICES

Explosives Division

APPENDIX A

Factories Licensed to Manufacture Explosives, 1958

Owner	Location of Factory	General Nature of Product
Canadian Industries Ltd.....	Beloeil, Que.....	Blasting explosives, black powders, nitro-compounds.
Canadian Industries Ltd.....	James Island, B.C...	Blasting explosives.
Canadian Industries Ltd.....	Nobel, Ont.....	Blasting explosives.
Canadian Industries Ltd.....	Brainerd, Man.....	Blasting explosives.
Canadian Industries Ltd.....	Brownsburg, Que....	Ammunition, detonators, blasting accessories, fusees, railway torpedoes.
Canadian Industries Ltd.....	Calgary, Alta.....	Blasting explosives.
Canadian Safety Fuse Co. Limited.....	Brownsburg, Que....	Safety fuse, detonating fuse, blasting accessories.
Canadian Arsenals Ltd.....	St. Paul'Ermite, Que.	Filling military shells and fuses.
Canadian Arsenals Ltd.....	Valcartier, Que.....	Filling military small arms ammunition.
Canadian Arsenals Ltd.....	Valleyfield, Que.....	Military explosives, propellants.
Du Pont of Canada Ltd.....	North Bay, Ont.....	Blasting explosives.
Cyanamid of Canada Limited..	Niagara Falls, Ont...	Nitroguanidine.
T. W. Hand Fireworks Co. Limited.....	Cooksville, Ont.....	Fireworks and military pyrotechnics.
T. W. Hand Fireworks Co. Limited.....	Papineauville, Que..	Fireworks and military pyrotechnics.
Croname (Canada) Ltd.....	Waterloo, Que.....	Toy pistol caps.
Montreal Fireworks Displays and Manufacturing Company	Ville La Salle, Que...	Display fireworks.
W. F. Bishop & Son Ltd.....	Unionville, Ont.....	Fireworks.
Superior Toy Ltd.....	Dundas, Ont.....	Toy pistol caps.
Modern Fireworks Ltd.....	Orangeville, Ont.....	Fireworks.

APPENDIX B

Explosives Imported into Canada, 1958

Class	Division	Description	Quantity
I	.....	Gunpowder.....	3,891 lb.
II	.....	Nitrate Mixtures.....	600 lb.
III	.....	Nitro-Compounds:—	
	1	Nitroglycerine Explosives.....	1,725,892 lb.
	2	(a) Propellants.....	11,121 lb.
	2	(b) For use in explosives factories.....	2,426,225 lb.
	2	(c) For other manufacturing purposes.....	4,398,242 lb.
V	1	Fulminates.....	900 lb.
VI	1	Primers.....	323,000
	1	Safety Fuse.....	22,000 ft.
	1	Safety Cartridges.....	16,470,977 rounds.
	2	Detonating Fuse.....	506,340 ft.
	2	Seismic Explosives.....	61,734 lb.
	2	"Nitramex 2H".....	2,756,369 lb.
	3	Detonators.....	197,683
	.....	Miscellaneous.....	24,848 lb.
VII	2	Manufactured Fireworks.....	1,876,762 lb.

Report for 1958

APPENDIX C

Part I

Accidents Involving Explosives During the Calendar Year 1958

Circumstances or Cause		Mines and Quarries			Elsewhere			Total		
		Acci- dents	Kill- ed	In- jured	Acci- dents	Kill- ed	In- jured	Acci- dents	Kill- ed	In- jured
In Use										
a	Delaying too long in lighting fuse.....	9	1	10				9	1	10
b	Premature firing of electrical blasts.....									
c	Not taking proper cover.....	10		11	2	2		12	2	11
d	Projected debris.....	4	1	9	3	2	3	7	3	12
e	Returning too soon after blasting.....	6		6	1		1	7		7
f	Improper handling of misfires.....	2		3	1	1		3	1	3
g	Rough tamping.....									
h	Ignition of explosives by flames, sparks, etc..									
i	Drilling into explosives.....	9	1	11	3	6	1	12	7	12
j	Striking unexploded charge in removing debris.....	6		8	2		10	8		18
k	Preparing charges.....	6		7	1	1	2	7	1	9
l	Using too short a fuse.....									
m	Insufficient ventilation after blasting.....	1		1				1		1
n	Springing shots.....									
o	Inadequate guarding.....	2		2				2		2
p	Various.....	3		3	2		2	5		5
Total.....		58	3	71	15	12	19	73*	15	90
In manufacturing.....								6	1	8
In keeping.....										
In conveyance (by road).....								5		
Total.....								11	1	8
In Misuse										
(a)	Detonators.....							13		19
(b)	Other explosives.....							2		4
(c)	Fireworks.....							7		11
(d)	Home-made explosives.....							13	3	16
Total.....								35†	3	50
Miscellaneous.....										
Total all circumstances.....		58	3	71	15	12	19	123	24	149

* These accidents occurred in circumstances not directly controlled by the Act.

† Brief descriptions of these accidents are given on the following pages.

Explosives Division

APPENDIX C

Part II

Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
<i>(a) Detonators</i>			
1-1	A 12-year-old boy was struck by pieces of rock and metal when a detonator exploded. The juvenile found the detonator at a construction site and set it off by striking it on a rock.....		1
2-4	While in the process of taking a detonator apart with a pair of pliers, it exploded in the right hand of a youth. It was necessary to amputate his thumb and index finger. His partner who assisted received minor burns. The detonators were stolen from a locked shack.....		2
8-4	Two teenagers were slightly injured when an abandoned detonator was exploded by a grass fire which they were fighting.....		2
7-5	A 16-year-old youth had part of his hand blown off, the result of a detonator exploding in his hand while he was trying to remove the explosives from it with a nail. He was showing young children how to remove the explosive when the accident happened.....		1
9-5	A mother and her two young children were slightly injured when apparently a detonator exploded in a brush fire at which they were spectators.....		3
16-6	An 11-year-old boy may lose the sight of his right eye as the result of a number of detonators exploding. He and three friends found detonators at a quarry site and these were placed on a fire which they made. An explosion occurred as the injured boy sat down by the fire, about a foot away.....		1
10-7	A 12-year-old boy had the ends blown off the thumb and index fingers of his left hand when he exploded a detonator. The detonators had been hidden in a stable about six years ago.....		1
11-10	A 12-year-old boy lost the sight of the left eye and had his index and middle fingers amputated at the second joint, also the thumb of his left hand. These injuries resulted when the boy applied a lighted match to a detonator, causing an explosion. Detonators were stolen from an unlocked box in an insecurely locked shed.....		1
22-10	A 12-year-old boy had his thumb and the tips of the fingers of his left hand blown off when he exploded a detonator. Explosives were obtained from an unlocked cupboard in an unlocked garage.....		1

Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(a) Detonators—Concluded			
9-11	An 8-year-old boy took a detonator from an unlocked cupboard at his home and caused an explosion by applying a lighted match while holding it in his left hand. The ends of his little and second fingers were blown off and a skin graft was required to save the third finger.....		1
22-11	Two boys aged 10 and 14 were injured, one seriously, when one of them struck a detonator with a rock and it exploded. Detonators were discovered at a work site, in a wooden box on which the padlock was not snapped shut.		2
5-12	Two 14-year-old boys sustained serious injuries to eyes, face, hands and legs when they exploded a detonator stolen from a licensed magazine. Apparently the door was not securely locked.....		2
17-8	Two boys entered unlocked and unattended buildings, stole a small quantity of detonators and fuse and set them off. One boy lost parts of three fingers and the thumb of his left hand.....		1
(b) Other Explosives			
17-9	An 11-year-old boy lost part of his left hand and suffered a thigh injury when he hammered a piece of "Primacord" he had found in a ditch, and caused it to detonate. The "Primacord" was apparently left by the blasting crew of a pipeline contractor who had been working in the area. The contractor was prosecuted under the Criminal Code, and fined \$1,000.....		1
12-12	Two men suffered from shock and severe burns to the face, hands and body following an explosion of gunpowder; another man received minor burns. Gunpowder was mistaken for forge coal and was used to activate a forge. Obviously the containers were not marked to indicate contents.....		3
(c) Fireworks			
12-5	Four young boys suffered severe burns and eye injuries when they ignited gunpowder obtained from portions of unexploded fireworks which they found following a major fireworks display.....		4
13-5	A woman sustained a compound fracture and deep lacerations of the left leg when a runaway rocket streaked along the ground and exploded after striking her. The rocket apparently tipped over as it was fired during a fireworks display.....		1

Explosives Division

Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(c) Fireworks—Concluded			
18-5	An 11-year-old boy sustained severe eye injuries when he bent down to pick up what he thought were unexploded fire-crackers and one went off.....		1
19-5	A 12-year-old boy sustained injury which necessitated skin grafts when firecrackers in his hip pocket exploded.....		1
20-5	A 15-year-old boy was treated in hospital for severe facial burns, cuts to the mouth and loosened teeth, following the explosion of a skyrocket. The injured boy was bending over the rocket when it exploded. One boy of the group involved in the incident admitted he had taken the rocket from a display show.....		1
21-5	The firing of a distress signal at a safety demonstration resulted in a badly cut hand to the demonstrator when the rocket-firing apparatus recoiled.....		1
26-5	Two teenagers were injured, one severely, when they misused fireworks obtained following a display. One of the boys apparently climbed a 25-foot pole to retrieve a stub of "Silver Rain" fireworks which he sealed in a copper tube and threw on a fire.....		2
(d) Home-Made Explosives			
6-1	A 17-year-old boy, trying to develop a new fuel for his home-made rocket, died from the effects of nitrobenzene poisoning.....	1	
10-1	A young man attempting to grind chemicals for use as a rocket fuel received first degree burns to his face and hands when the mixture exploded. The room in a private house where the operation was being carried out was damaged by the explosion and fire. Since this was a second offence prosecution followed and resulted in conviction and suspended sentence.....		1
1-3	A Grade XI student's first attempt at making a model rocket had an unfortunate ending when it exploded prematurely. His right hand was mutilated.....		1
2-3	Four young boys made small rockets and launched a number of them but this dangerous practice came to an abrupt end when one of the boys received injuries of a minor nature as a result of one of the rockets exploding on the ground.....		1
11-5	During experiments in a highschool laboratory after hours, a "rocket fuel" ignited with sufficient violence to scorch the paint of the ceiling. Two boys sustained first degree burns. When the leader displayed bravado, prosecution was entered under the Act and resulted in conviction and suspended sentence.....		2

Misuses of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(d) Home-Made Explosives—Concluded			
19-6	A 14-year-old youth received critical injuries, resulting in the amputation of his left leg and severe internal injuries when a home-made rocket exploded during the course of construction. His 15-year-old friend sustained superficial burns.....		2
14-9	A 15-year-old youth who developed a model rocket was severely injured when powdered chemicals exploded in his hand. He suffered facial and hand injuries and may lose the sight of one eye.....		1
5-10	A home-made rocket exploded while being set up for a backyard launching and injured two boys. The explosive mixture was packed into a chrome-plated steel tube. The builder of the rocket suffered a badly cut left hand while the second boy, one of the several youngsters standing around, was hit in the left hand by a piece of flying metal.....		2
9-2	A bottle of silver fulminate brought to school "for a lark" exploded and seriously injured two students.....		2
11-4	One man was killed and another injured when a can of home-made blasting powder exploded. The men had been using the explosive to blast stumps on a farm and were placing their equipment in the trunk of a car when the explosion took place. It is believed that a steel auger rubbing on the top of the can of powder set off the sensitive mixture through friction.....	1	1
2-10	A 15-year-old boy constructed a home-made gun from a length of pipe plugged at one end with a bolt. A hole was drilled near the end of the pipe, a fuse inserted and the pipe filled with gunpowder purchased from a local sporting goods store. The attempt to fire this device proved fatal.....	1	.....
10-10	A 15-year-old high school student lost a thumb and part of a finger when a home-made bomb exploded. An explosive mixture was tamped into a length of galvanized pipe closed at one end. It was reported the injured boy had been closing the other end with a hammer when the accident happened.....		1
18-11	Two teenagers were seriously injured when a home-made flare exploded as one of the boys held it against the ground in an attempt to extinguish it.....		2

Explosives Division

Misuses of Explosives

Ref. No.	Cause of Accident	Killed	Injured
<i>Miscellaneous</i>			
6-3	A miner committed suicide by means of explosives.....	1	.....
14-8	An Italian immigrant was killed when a dynamite bomb wired to the ignition of a car exploded at the touch of the starter.....	1	.....
15-8	A young Doukhobor was killed and another blinded in the explosion of a home-made bomb which they no doubt intended to use in an outrage.....	1	1
17-11	Two men were killed when dynamite apparently intended for an outrage exploded prematurely.....	2	.....

*Authorized Explosives**Canadian Industries Limited (Explosives Division)*

Amex
 Amite
 Ammonia Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent.
 Ammonia Dynamite, Agricultural—60 per cent (for export only).
 Ammonia Dynamite Extra 40, 50, 60 and 70 per cent (for export only).
 Ammonia Dynamite, Free Running—40, 65 per cent.
 Ammonia Dynamite, High Density—20, 25, 30, 35, 40, 50, 60 per cent (for export only).
 Ammonia Dynamite, Low Density—20, 25, 30, 35, 40, 50, 55, 60 per cent (for export only).
 Ammonia Dynamite quarrying—60 per cent.
 Ammonia Dynamite, Seismograph—60 per cent (for export only).
 Ammonia Dynamite, Stumping—20 per cent (for export only).
 Ammonia Gelatin 30, 35, 40, 50, 60, 75, 80, 90 per cent (for export only).
 Black Blasting Powder.
 Black Sporting Powder.
 Blastol—60 per cent.
 BRX-7-75 per cent.
 Cilgel-B and Cilgel-C 70 per cent.
 C.I.L. Dynamite Nos. 2, 3, 4 and 5.
 Cordite—MD, MDT, W, WT, WM, WMT.
 C-X-L Dynamite—Nos. 1 and 5.
 C-X-L Gelatin—Nos. 1 and 2.
 C-X-L-ite.
 Di-Drill Gelatin—60 per cent.
 Ditching Dynamite—50 per cent.
 Driftite and Driftite-D 70 per cent.
 Dygel—75 per cent.
 Dynamex—40, 50, 60 and 70 per cent.
 Excel-G, Excel-S and Excel GW 75 per cent.
 Explosives BL-100, BL-112, BL-114, BL-115, BL-116, BL-120, BL-122, BL-123 and BL-125.
 Forcite—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
 Fuse Powders—30, 40, 44, 53, 57 and 65 seconds.
 Gelatin Dough—90 per cent.
 Geogel
 Gelignite—34, 42, 51, 62 per cent (for export only).
 Giant Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
 Guhr Dynamite.
 Guncotton.
 Gunpowder.
 Gypsumite "A", "B" and "C".
 Hi-Velocity Gelatin 40, 60, 75 and 80 per cent.
 Hydromex and Hydromex-D.
 Liquid Nitroglycerine.
 Lump-Kol Pellet Powder.
 Monobel, Nos. 4, 6, 7, 10, 11 and 14.
 Monobel, sheathed—Nos. 4, 7 and 10.
 Monobel, X(EQ.S.).
 Nitrocotton.
 Nitrone T-1, T-3 and T-4.
 Nitrone Primer.
 Nitrone S-1.
 Nitrone S-1 Primer.
 Nitropel.
 Nitrox.
 Pellet Powder No. 2.
 Pentolite Primers.

Explosives Division

Canadian Industries Limited (Explosives Division)—Continued

Polar Stumping Powder—20 per cent.
Pyromex.
Seismic Gelatin—60 per cent (for export only).
Semi-Gelatin No. 1, 2, 3, 4 and 5 (for export only).
Signal Bombs.
S.N.G.
“Special No. 1” Dynamite.
Stopeite, 20, 25, 30, 35, 40, 50, 55 and 60 per cent.
Straight Gelatin—25, 30, 35, 40, 50, 60, 75, 80, 90 per cent (for export only).
Submagel—40, 50, 60, 75, 80 and 95 per cent.
Trinitrotoluene.
Vibrex—60 per cent.

Canadian Safety Fuse Co. Ltd.

Detonating fuse, “B-Line”, “Primacord”.
Hot Wire Fuse Lighters.
Igniter Cord—“Thermalite” Brand. Types A and B.
Igniter Cord Connectors—“Thermalite” Brand.
Safety Fuse.

Canadian Industries Limited (Ammunition Division)

Ammunition.
Detonating Fuse Primer.
Detonators.
Dextrinated Lead Azide.
Gasless Delay Electric Blasting Cap, X-107.
Highway Flares.
Igniter Cord Electric Starter.
“Lead Salt”.
Lead Styphnate (Normal).
MS Detonating Relay.
Percussion Caps.
Railway Fuses.
Railway Torpedoes.
Styphnic Acid.
“SURESHOT” Booster.
Tetrazene.

DuPont of Canada Limited, Montreal, Que.

DuPont Ditching Dynamite.
DuPont Extra Nos. 1, 2, 3, 4 and 5.
DuPont Gelatin—25, 40, 50, 60, 75 per cent.
DuPont Stumping Dynamite.
Energex—40, 50, 60 per cent.
Energex FR—25, 40, 65 per cent.
Energite—40, 50, 60 per cent.
Gelex-A, 1, 2 and 3.
Gypsal Nos. 1 and 2.
Hi-Velocity Gelatin, 40, 60 and 75 per cent.
NBL-101, NBL-102 and NBL-201.
Semi-Gelatin No. 1.
Special Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
Submarine Hi-Velocity Gelatin—60 and 80 per cent.

Cyanamid of Canada, Niagara Falls, Ont.

Nitroguanidine.

Pursuant to Section 8 of the Act, ammonium nitrate blended with fuel oil is an authorized explosive.

Authorized explosives manufactured by other than Canadian firms:

Aerojet Engineering Corporation, Azusa, Calif.
Aeroplex AK14 Propellant.

Aktiebolaget Bofors, Nobelkrut, Bofors, Sweden.
Smokeless Sporting Powder.
Detonating Fuse, (Bofors type).

American Cyanamid Co., Latrobe, Pa.
Fulminate of Mercury.
Detonators.

Atlas Diesel Co., Stockholm, Sweden.
Engine Starting Cartridges.

Atlas Powder Co., Wilmington, Del.
Atlas Gelatin 60 per cent and 75 per cent.
Atlas RXL-198.
Detonators.
Giant Gelatin—40, 60 and 75 per cent.
Giant Gelatin High Velocity 60 per cent.
Shaped Charges.
Subgel A

Austin Powder Co., Cleveland, Ohio.
Black Pellet Powder.

Leon Beaux & Co., Societa Italiana Munizioni, Milan, Italy.
Small arms ammunition.

Bermite Powder Co., Saugus, Calif.
Baker Power Charge No. 661.
Firing Head Igniter—Product No. 660.

Cardox Corporation, Chicago, Ill.
Cardox.
Cardox Heaters.

Cartoucherie Française, Paris, France.
Small Arms Ammunition.

Cascade Cartridge Co., Lewiston, Idaho.
Primers.

De Kruithoorn N.V. Nederlandsche Jachtpatroonfabriek, 'sHertogenbosch, Holland.
Shotgun Shells 12, 16, 20 gauge.

Deutsche Jagdpatronenfabrik G.M.B.H. 14 (b) Rothweil a.N. West Germany.
Shotgun Cartridges.

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.
Auxiliary Charges C. 63.
Black Fuse Powder.
Detonators.
DuPont Bulk Powder.
DuPont Ditching 50 per cent.
DuPont Extra—A, C, E, F, G.
DuPont Gelatin—25, 40, 50, 60, 75 per cent.
Dupont Pistol Powder No. 6.

Explosives Division

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.—Concluded

Elcord Delay Unit.
Explosive Rivets.
Fulminate of Mercury.
F.N.H. Ground Smokeless Powder.
Gelex—Nos. 1, 2, 3.
High Temperature E.B. Caps, No. 6.
Hi-Velocity Gelatin—40, 60, 75 per cent.
Improved Military Rifle Powders.
Jet Tappers.
Nitramon A.
Nitramon 2.
“Nitramon S”.
“Nitramon S” Primers.
Nitramon Primer.
“Nitramex” No. 2.
Nitramex 2H.
Nitramite.
Nitramite Primer.
Nitrocellulose.
Nitrostarch.
Oil Well Explosives S.O.W.E. No. 1 and EL-431-A.
Open hole Shaped Charges (R.D.X. or Pentolite).
P.6 Seismograph Booster.
“Pelletol” Nos. 1 and 2.
Perforating Shaped Charges (R.D.X. or Pentolite).
P.E.T.N.
“Primacord” Booster.
“Primacord” MS Connectors.
Pyro (ground smokeless) Powder.
Red Cross Extra—40, 50, 60 per cent.
Red Cross Extra (H.W.R.) 40, 50, 60 per cent.
Smokeless Powders.
Special Gelatin—30, 40, 50, 60, 75, 80, 90 per cent.
Special Primer with Booster (4 x 7.5 lb.).
Sporting Rifle Powders.
Submarine Hi-Velocity Gelatin—60, 80 per cent.
Tetryl.
Waterproof Boosters C. 66.

Dynamit-Actien-Gesellschaft, Nuremberg 2, Germany.

Delay Connectors.
Detonators and Electric Detonators.
Detonating Fuse “Nobel Cord”.
R.W.S. Rimfire Cartridges.

Ellefsens Tendskruefabrikk, Stokke, Norway.

Time Fuses and Detonators for Whaling Guns.

Ensign Bickford Company, Simsbury, Conn.

Ignitacord.
Igniter Cups.
Lead Spitters.
“Primacord-Bickford” Fuse.

ETS. Brandt, La Ferte St. Aubin (Loiret), France.

Shaped Charges 3 3/8" & 5".

ETS. Billant, Usine Du Prado, Bourges 9 (Cher), France.

Shaped Charges 3 3/8".

Federal Cartridge Corporation, Minneapolis 2, Minn.

Shotgun Cartridges.

Federal Laboratories, Pittsburgh, Pa.

Lachrymatory Cartridges.

Powder Loads.

Gevelot, S.A., 50 Rue Ampere, Paris, France.

Shotgun Cartridges.

Giullio Fiocchi, Lecco, Italy.

Power Tool Cartridges, Q 4.

Metallic Cartridges, Cal 9 mm short and 7.63 mm Mauser.

Shotgun Cartridges, 12 gauge and 24 gauge.

Shot Shell Primers and Percussion Caps.

Go Oil Well Services Inc., Fort Worth, Texas.

Jet Perforators.

Gustav Genschow & Co. Aktiengesellschaft, Hamburg, Germany.

"Express" Shot Gun Cartridges.

"Geco" Safety Cartridges, 6.35 mm, 7.65 mm and 9 mm.

Haerens Ammunition Arsenal, Denmark.

Safety Cartridges 6.5 mm x 55.

Hercules Powder Company, Wilmington, Del.

Detonators.

Gelatin Oil Well Explosive.

Explosive E.P. 172-1 & 2.

Gelamite D.

Gelatin Extra—40 and 60 per cent.

High Pressure Gelatin—60 per cent.

Nitrocellulose.

Smokeless Powders.

Vibro Caps.

Vibrogel B and 3.

Hirtenberger Patronen—Zuendhuetchen, Hirtenberg, Lower Austria.

Small Arms Ammunition.

Hull Cartridge Co., Hull, Yorkshire, England.

Shotgun Cartridges, 12 gauge.

Imperial Chemical Industries Limited, England.

Black Sporting Powders FG, FFG, FFFG and NFFFG.

Black Whaling Powder.

Cerium Low Tension Fuseheads.

Detonating Relays.

Detonators.

Fireworks Powders, Cannon, Meal.

Gunpowder G-7, G-12, G-20.

Gunpowder SFG-12, SFG-20, Sulphurless mealed.

Pentaerythritol Tetranitrate (P.E.T.N.).

Percussion Caps.

Safety Cartridges.

Saluting Powder.

Smokeless Powder.

Smokeless Whaling Charges.

Tetryl.

Explosives Division

Jet Guns Company, Neil P. Anderson Bldg., Fort Worth, Texas.

Shaped Charges, 1 3/4", 2 3/16".

Glass Gun Perforating Charges, G.G. 2, G.G. 4, G.G. 7.

Kemode Manufacturing Co. Inc., New York, N.Y.

"Quik-Shot" Cartridges.

Kilgore Incorporated, Westerville, Ohio.

Flashlight Cartridges.

Powder Loads.

King Powder Co., Cincinnati, Ohio.

Black Pellet Powder.

Lake Erie Chemical Co., Cleveland, Ohio.

Lachrymatory Cartridges.

Lane-Wells Co., Los Angeles, Calif.

Gun Perforator Cartridges.

Mid Continent Torpedo Co. Ltd., Tulsa, Okla.

Red Head Firing Heads.

M. McKinley Co., Bellaire (Greater Houston), Texas.

Shells SP Nos. 51, 70, 100.

Nitroglycerin Aktiebolaget, Gyltorp, Sweden.

Shotgun Tracer Cartridges.

A. B. Norma Projektilfabrik, Amotfors, Sweden.

Safety Cartridges.

Olin Mathieson Chemical Corp., East Alton, Ill.

Cyclonite.

Detonators.

Kiln Gun Shells.

Linemen's Flare Lights.

Normal Lead Styphnate.

Railway Fuses.

Railway Torpedoes.

Western Ball Powder.

"Western" Small Arms Ammunition.

"Winchester" Small Arms Ammunition.

T. Page-Wood Limited, Bristol, England.

Safety Cartridges.

Patronenfabrik, A.C., Solothurn, Switzerland.

Safety Cartridges 7.5 mm.

Perforating Guns Atlas Corporation, Houston, Texas.

Jet Perforating Charges.

Petroleum Tool Research Inc., Fort Worth, Texas.

Detonator assembly.

Vibro-shot Charge assembly.

Poudreries Nationales, France.

D-2 Propellant Powder.

Pringle Powder Company, Bradford, Pa.

Liquid Nitroglycerine.

Remington Arms Co. Inc., Bridgeport 2, Conn.

Stud Driver Cartridges.

"Remington" Small Arms Ammunition.

"Peters" Small Arms Ammunition.

"Springfield" Small Arms Ammunition.

Rey Frères, Paris, France.

Detonators and Electric Detonators.

Safety Fuse T.T.

F. J. Roberts Squib Company, Punxsutawney, Pa.

Miners' Safety Squibs.

Rohm-Gesellschaft, Sontheim/Brenz, Kreis Heidenheim, Germany.

6 mm. Blank Cartridges.

RG-3 Signal Cartridges.

Shaped Charge Explosive Manufacturers, Inc., Martinsburg, W. Va.

Plurajet Blasting Units (Not for underground use).

Standard Railway Fusee Corporation, Boonton, N.J.

Railway Torpedoes.

Trojan Powder Company, Allentown, Pa.

Nitrostarch

Trojan 40% S, 50% S, ESX, ESX-LD, PT-3X, TL-501-B.

Winchester Arms Company, Cleveland, Ohio.

"Tempotool" Cartridges.

Authorized Fireworks

Fireworks Manufactured by the following Canadian makers are authorized:

W. F. Bishop & Son Limited, Toronto, Ont.

Canadian Industries Limited, Montreal, Que.

Canadian Safety Fuse Company Limited, Brownsburg, Que.

Croname (Canada) Ltd., Waterloo, Que.

Dominion Fireworks Co. Ltd., Dixie, Ont.

T. W. Hand Fireworks Co. Ltd., Cooksville, Ont., and Papineauville, Que.

Modern Fireworks Ltd., Orangeville, Ont.

Montreal Fireworks Displays and Manufacturing Co., Ville St. Pierre, Que.

Superior Toy Limited, Dundas, Ont.

Certain fireworks manufactured outside of Canada by the following makers are authorized:*

Acme Fireworks Corporation (Acme Novelty Manufacturing Company) River Grove, Ill.

Aerial Products Incorporated, Merrick, Long Island, N.Y.

American Railway Signal Company, Fostoria, Ohio.

Anthes Force Oiler Company, Fort Madison, Iowa.

Astra Fireworks Ltd., London, England.

Atlas Fireworks Co. Inc., Los Angeles 22, Calif.

M. Backes' Sons Inc., Wallingford, Conn.

* A list of authorized fireworks is on file in the office of the Explosives Division. Information may be obtained on request.

Explosives Division

J. G. W. Berchkholtz, Hamburg-Bahrenfeld, Germany.
Hermann Bischoff, Bremen, Germany.
Oswald Bradley Ltd., Southport, Lancs., England.
C. T. Brock & Co., Hemel Hempstead, Herts., England.
Brookside Pyrotechnic & Chemical Co., Elkton, Md.
Contimetal Industry (Hemel Hempstead) Ltd., Hemel Hempstead, Herts., England.
EM-GE Sportgerate K-G Gerstenberger & Co., Wurttemberg, Germany.
J. Halpern Co., Pittsburg, Pa., Distributors for Lenover Corporation, Chester, Pa., and Lenover, Pa.
Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland.
Hitt Fireworks Company Limited, Seattle, Wash.
Hudson Fireworks Display Company, Hudson, Ohio.
Illinois Fireworks Co., Danville, Ill.
Interstate Fireworks Manufacturing and Display Company, Bridgewater, Mass.
Japan Fireworks Trading Company Ltd., Tokyo, Japan.
Jatina Manufacturing Co. Inc., Mount Vernon, N.Y.
Keystone Fireworks Manufacturing Co. Inc., Dunbar, Pa.
Kilgore Incorporated, Westerville, Ohio.
Lakeside Railway Fusee Company, South Beloit, Ill.
Lenover Corporation, Chester, Pa., and Lenover, Pa., J. Halpern, Pittsburg, Pa., Distributors.
Oscar Lunig, Stuttgart—Mohringen, Germany.
Marutamaya Ogatsu Fireworks Co., Tokyo, Japan.
C. Schauer Nachfolger, Berlin, Germany.
National Fireworks Incorporated, West Hanover, Mass.
New Jersey Fireworks Mfg. Co. Inc., Elkton, Md.
Norsk Sprængstofindustri—A/S, Nittedal, Norway.
S.V. Olsen, Valby Tingsted, 10 Kobenhavn VBY, Denmark.
Olin Mathieson Chemical Corporation, New Haven, Conn.
N.V. Pyro, Klazienaveen, Holland.
Pyrotechnischen Fabriken, Wuppertal-Ronadorf, Germany.
Pyrowerk, Hamburg-Newgraben, Germany.
Reliance Snap Company, Bishop's Stortford, Herts., England.
Richard Appel's Jo King, New York 12, N.Y.
Saburo Inagaki, Okazaki City, Japan.
Saburo Ishibashi, Tokyo, Japan.
Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England.
Standard Fireworks Limited, Huddersfield, England.
Standard Railway Fusee Corporation, Boonton, N.J.
Stehling and Co., Hamburg 11, Germany.
The J. & E. Stevens Sales Co., New York, N.Y.
Superior Signal Co., Incorporated, South River, N.J.
United Fireworks Manufacturing Company, Dayton, Ohio.
U.S. Fish and Wildlife Service, Pocatello, Idaho.
Van Karner Chemical Arms Corporation, New York, N.Y.
Messrs. Waeco Ltd., High Post, Salisbury, England.
Joseph Wells & Son Limited, Dartford, Kent, England.
Joh. Chr. Wendt, Hamburg, Gr. Borstal, Germany.
Wunderkerzen-Werk Carl Flemming, Hamburg-Neugraben, Germany.
Yuki Node, Shimozuma-Machi, Makabe-Gun Ibaragi-Prefecture, Japan.

Chinese firecrackers with gunpowder composition and not exceeding 4" in length and 9/16" in diameter, and small Chinese Fireworks, are authorized when found to function satisfactorily on examination at port of entry.

